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# Smoke-free Laws and Employee Turnover

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# **Smoke-free Laws and Employee Turnover**

## **Final Report**

**The Robert Wood Johnson Foundation  
Substance Abuse Policy Research Program**

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## **I. STUDY METHODOLOGY AND FINDINGS**

### **A. PROJECT SIGNIFICANCE**

The purpose of this study was to examine the effects of smoke-free laws on employee turnover and training costs in one large national restaurant chain. The public health benefits of smoke-free laws are well-known. If all workplaces in the United States implemented smoke-free policies, about 178,000 smokers would stop smoking while those who continued would consume 10 billion fewer cigarettes per year.<sup>1</sup> As information about the health consequences of exposure to secondhand smoke has increased over the past 30 years,<sup>2-5</sup> many state and local governments have enacted laws to restrict smoking. Today, over 2,300 local communities and 17 states have enacted smoke-free laws. Enacting the first "clean indoor air" laws in 1973, Arizona led the way among states.<sup>2</sup> In 1998, California enacted the most comprehensive smoking restrictions in the country, banning smoking in all places of employment including bars and restaurants. On July 1, 2003, Lexington, Kentucky, in the heart of tobacco country, passed a smoke-free ordinance banning smoking in all public places. Although business profitability is often hotly debated as communities experience the smoke-free policymaking process, there is substantial research showing that smoke-free laws have no negative economic impact on revenues, employment, business closure, and employment insurance claims.<sup>6-8</sup> This study addressed the potential impact of smoke-free laws on employee turnover and training costs, factors that have not been examined in prior research.

Research regarding smoking and productivity costs has primarily focused on the smoking behavior of employees, their health, and labor market outcomes,<sup>9-12</sup> rather than business operating costs such as employee turnover and training costs. Bar and restaurant

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workers' exposure to secondhand tobacco smoke is 1.5-4.4 times greater than that of individuals living with smokers.<sup>13</sup> Passive smoking causes coronary heart disease, lung cancer, and various respiratory ailments.<sup>14-16</sup> Passive smokers also experience other health conditions including eye irritation, headaches, nasal symptoms, coughs, wheezing, and hoarseness.<sup>17</sup> These conditions have the potential to adversely affect the labor productivity and job tenure of workers exposed to secondhand tobacco smoke.

***Theoretical rationale.*** The labor market model used in this study is a "matching" model which assumes that workers and employers learn about each other in the first few years of employment so that the employment match, if it survives, becomes more stable over time.<sup>18-20</sup> The consequence is that the likelihood of an employee separating from their job falls over time. The introduction of a smoke-free law may introduce a shock to the matching process between employees and employers, since a smoke-free law would affect conditions in the workplace for bar and restaurant workers. A smoke-free law also may have a long-term positive effect of reducing employee turnover due to the health benefits of no longer working in a smoke-filled environment.

## **B. BACKGROUND**

***Employee Turnover.*** The economic literature indicates that the likelihood of a worker's separation from their job falls with tenure on the job. Mincer and Jovanovic<sup>21</sup> describe this relationship between separation and tenure in a particular job as a hazard function, reflecting that the likelihood of separation is a function of tenure. However, researchers also use a logit or probit model of the probability of separation where tenure and its square are exogenous variables.<sup>18-21</sup> Personal characteristics also influence the propensity of separation from a job at any particular time. Mincer and Jovanovic<sup>21</sup> and

McLaughlin<sup>19</sup> find that more educated workers experience fewer job separations. Bartel and Borjas<sup>18</sup> posit a relationship between health and separation rates, while Meitzen<sup>22</sup> indicates a difference in quit rates by sex. The influence of these factors diminishes once tenure is introduced into models of employee separation, since each factor would also have influenced the likelihood of separation earlier in the match between employee and employer. Changing labor market conditions in the local area also would introduce a shock to the matching process by changing the potential for alternative employment.

Job amenities serve as determinants of job satisfaction and job tenure.<sup>23-25</sup> Similarly, a disamenity created by smoking may affect workplace turnover. Other potential productivity costs may be realized if employee dissatisfaction from working in a smoking environment affects performance. Employees working next to smokers report annoyance and dissatisfaction about working in an environment with secondhand smoke.<sup>26, 27</sup>

***Smoking and business costs.*** Every year in the U.S., smoking costs the U.S. more than \$75 billion in direct health care costs and more than \$80 billion in lost productivity costs.<sup>28</sup> Direct medical costs include preventing, diagnosing, and treating smoking-related diseases such as heart disease, cancer, and emphysema. There also are indirect morbidity and mortality costs associated with lost earnings due to smoking-related illnesses and lost future earnings due to premature smoking-attributable deaths.<sup>29</sup> Loss of on-the-job productivity is due primarily to the number and length of smoking breaks.<sup>29, 30</sup> According to the U.S. Bureau of National Affairs, a smoking employee costs the employer at least \$1,000 more than a nonsmoking employee every year in absenteeism, reduced productivity, and higher health, fire, and life insurance.<sup>31</sup> Some estimate smoking and business annual

costs to be much higher, from \$4,800 to as much as \$10,000 per smoker including both direct and indirect costs from absenteeism, property damage, maintenance, and passive smoking.<sup>32, 33</sup> In addition, exposure to secondhand tobacco smoke at work can cause burning of the eyes and nose, headaches, and nausea in nonsmokers and may affect their morale and productivity.<sup>30</sup> Businesses that ban smoking report that office cleaning costs are reduced, and equipment such as computers lasts as much as 60% longer in clean air.<sup>30</sup>

It is well-documented that smoking employees have a higher number of absence days<sup>34, 35</sup> than non-smoking employees.<sup>36-38</sup> Similarly, non-smoking employees who are exposed to secondhand smoke on the job have a higher number of absence days than non-smoking employees who are not exposed to secondhand smoke at work.<sup>39</sup> About 19% of all absenteeism in the workplace is due to smoking-related illnesses which amounts to over 80 million absences per year in the U.S.<sup>30</sup> In one prospective study of postal workers, smokers had 34% more absenteeism compared to nonsmokers, after controlling for age, sex, race, exercise, drug abuse, and job category.<sup>40</sup> Not only were smokers more likely than nonsmokers to take sick leave and leave without pay, they also were more likely to report work-related accidents and injuries.<sup>40</sup> Smoking employees also were at higher risk for turnover and disciplinary action compared to nonsmoking employees.<sup>40</sup>

***Public health benefits of smoke-free laws.*** Secondhand smoke is a major source of indoor air pollution, particularly in the workplace. Almost 18 years after the initial report on the harmful effects of secondhand smoke, the Environmental Protection Agency (EPA) classified tobacco smoke as a Group A (known human) carcinogen responsible for 3,000 lung cancer deaths annually in American nonsmokers.<sup>41</sup> In addition, it is estimated that exposure to secondhand smoke in nonsmokers accounts for as many as 62,000 deaths

per year from coronary heart disease.<sup>42</sup> Even short-term exposure to secondhand smoke (30 minutes) in relatively low doses places healthy nonsmokers at risk for developing heart disease by interrupting normal coronary circulation.<sup>43</sup> Long-term, regular exposure to occupational secondhand smoke is associated with increased lung cancer risk among nonsmokers.<sup>44</sup> Smoke-free laws also protect children and adults from respiratory diseases associated with secondhand smoke exposure.<sup>17</sup>

Restrictions on smoking in public places and private workplaces reduce both smoking prevalence and average daily cigarette consumption among smokers<sup>45-55</sup> and increase cessation attempts.<sup>56</sup> Farkas et al.<sup>56</sup> found that among adult smokers, both workplace and household smoking restrictions were associated with higher rates of cessation attempts, lower rates of relapse in those who attempted to quit, and higher rates of light smoking (< 15 cigarettes/day) among current daily smokers. Smoke-free workplaces are associated with a 29% drop in cigarette consumption.<sup>1</sup> Employees who work in a smoke-free environment are less likely to smoke than those who work in establishments that allow smoking.<sup>45</sup> Youth who work in smoke-free establishments also are significantly less likely to smoke than those who work in places without a smoking ban.<sup>57</sup> Smokers in communities with strong ordinances that restrict workplace smoking are more likely to quit than those who live in communities with no workplace smoking ordinances.<sup>58</sup>

Although smoking restrictions are primarily intended to reduce nonsmokers' exposure to secondhand smoke, research suggests that they also can lead to significant reductions in cigarette smoking since they reduce the smoker's opportunities to smoke or otherwise raise the "cost" of smoking. In addition, restrictions on smoking may alter the



perceived norms related to smoking by changing attitudes concerning the social acceptability of smoking<sup>59</sup> and increase public awareness about the dangers of cigarette smoking.<sup>45</sup>

***Economic impact of smoke-free laws.*** There is a frequent misperception that smoke-free laws adversely affect the restaurant and bar industries; however, many studies dispute this claim. One study found that New York City's 1995 Smoke-free Air Act had no adverse effects on restaurant employment growth which was three times higher than the rest of the state from 1993 to 1997.<sup>60</sup> Another study examined sales tax receipts in 15 cities with ordinances banning smoking in restaurants and 15 cities without such ordinances from 1986 to 1993; smoke-free ordinances did not negatively impact restaurant sales.<sup>61</sup> Similarly, Sciacca and Eckrem<sup>62</sup> found that gross restaurant sales in Flagstaff, Arizona increased 16 % to 25.8% one year after a smoke-free ordinance was implemented. Similarly, other studies examining bar and tourism receipts have shown no adverse effects of smoking ordinances on revenues.<sup>63-65</sup>

In a recent study of the El Paso, Texas smoking ban, the strongest smoke-free ordinance in that state, there were no changes in restaurant or bar revenues when comparing sales tax and mixed-beverage tax data during the 12 years preceding and one year after the smoking ban was implemented.<sup>66</sup>

Businesses can expect to benefit from reduced operational costs associated with smoke-free environments. These costs include maintenance, cleanup, and the replacement of smoke-damaged furnishings, machines, equipment, floors, and wall coverings.<sup>67, 68</sup> Other cost savings include reduced fire insurance premiums due to lower risk of fires.<sup>69</sup>

**Summary.** Prior to this research, there were no studies that examined the association between smoke-free laws and employee turnover. The literature on employee turnover implies that exposure to secondhand smoke and dissatisfaction with workplace smoking policies may act as disamenities in the workplace that affect employee turnover. Given the tremendous business costs of smoking and secondhand smoke exposure in the workplace, this study of the effect of smoke-free laws on employee turnover and restaurant training costs provides important information for health advocates, the hospitality industry, and policymakers.

## C. RESEARCH DESIGN AND METHODS

**Research design and sampling.** A time series design with treatment and control groups was used for this study. Data from employees in 75 Applebee's restaurants ( $N = 34,660$ ) was available for two-week pay periods from April 1999 through April 2004.<sup>1</sup> Each two-week pay period for each employee served as a single observation. Of the 75 restaurants, 12 were smoke-free as of 2004 including three that opened smoke-free. Presence of a smoke-free ordinance was obtained from the Americans for Nonsmokers' Rights database ([www.no-smoke.org](http://www.no-smoke.org)) and confirmed with company management.

The Control Group consisted of restaurant payroll records during any period when a restaurant did not face a local smoking ban, either because the community where the restaurant was located never had a smoke-free law or because the ban was not yet in effect. There were 504,293 payroll records in the Control Group. Two treatment groups

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<sup>1</sup>As of December 2002, there were 1,496 Applebee's restaurants in 49 states and nine countries, of which 1,139 were operated by franchisees. In 2002, Applebee's reported total system sales in excess of \$3 billion.

included restaurant payroll records during any period when a restaurant experienced a local smoke-free ordinance. Treatment Group I included 14,927 post-ban payroll records from employees who worked at a restaurant both before and after a community smoke-free law was implemented. For these workers, the introduction of a smoke-free law represented a potential “shock” to their work situation. Treatment Group II included 69,966 payroll records for employees who worked at a restaurant only after a community smoke-free law was implemented.

*Measures.* The principle source of data was the monthly employment records of Thomas & King, a franchise operator of the 75 Applebee’s restaurants. Data from the Thomas & King electronic payroll system was available starting in April 1999. Table 1 summarizes the study variables and their measures. Employee turnover was defined in this study as separation from a job.<sup>18</sup> Personal characteristics of workers such as age, sex, and ethnicity was available from Thomas & King payroll system records. The tenure of the worker and average weekly income also was available from this source. Local labor market conditions were modeled in terms of the local unemployment rate and by isolating white noise shocks to local labor market conditions.<sup>74</sup> Data on county unemployment rates was obtained from the Bureau of Labor Statistics. Thomas & King provided the zip code of residence for each employee so that unemployment for the county of residence could be used. Applebee’s also provided data on employee hiring and training costs associated with employee turnover.

**Table 1. Study Variables and Their Measures**

<b>Variable (Name)</b>	<b>Measure</b>	<b>Level of Measurement</b>	<b>Unit of Analysis</b>
Employee Separation (Sep)	Whether the employee left the job during the time period 0 = No 1 = Yes	Categorical	Individual
Smoke-free Law (Law)	Length of time law has been implemented in months	Continuous	County or City
Age (Age)	Age in years	Continuous	Individual
Sex (Sex)	0 = Male 1 = Female	Categorical	Individual
Ethnicity (Ethn)	1 = Caucasian 2 = African American 3 = Hispanic 4 = Asian 5 = Other	Categorical	Individual
Average Weekly Income (Inc)	Dollar amount of salary and tips per month	Continuous	Individual
Job Tenure (Ten)	Number of months employed	Continuous	Individual
Type of Job (Type)	1 = Server 2 = Hostess 3 = Manager 4 = Cook 5 = Bartender 6 = Bus Person	Categorical	Individual
Labor Market Conditions (LM)	County unemployment rate (monthly %)	Continuous	County
Restaurant Training Costs	Dollar amount of hiring and training obtained quarterly	Continuous	Restaurant

**Procedure.** Institutional Review Board approval was obtained from the University of Kentucky. Thomas & King queried their payroll data base and provided a de-identified electronic data file and a source code book to the research team. The data gathered from Applebee's data file and individual restaurant managers was organized into a data set and

verified. Summary training cost data for managers, kitchen workers, and servers was provided by staff at Thomas & King headquarters.

**Data analysis.** Employees in the panel data had variable lengths of follow-up since some had longer job tenure than others. The econometric approach in the analysis, however, adjusted for such an unbalanced panel of data.

**Specific Aim # 1. Determine the effect of implementation of smoke-free laws on employee turnover (separation) in a national restaurant chain, controlling for employee characteristics of age, income, job tenure, and labor market characteristics.** The probability of separation (Sep) for employees in any particular period were modeled as a function of job tenure (Ten) and job tenure-squared, worker characteristics (Age and race), and duration of implementation of the smoke-free law (Law). The labor market variables were found to have no statistically significant effect on turnover and were dropped from the analysis. Two treatment groups included restaurant payroll records during any period when a restaurant experienced a local smoke-free ordinance. Treatment Group I included 14,927 post-ban payroll records from employees who worked at a restaurant both before and after a community smoke-free law was implemented. Two series of models were generated. One series compared treatment group I with the control group.

The control group consisted of restaurant payroll records during any period when a restaurant did not face a local smoking ban, either because the community where the restaurant was located never had a smoke-free law or because the ban was not yet in effect. There were 504,293 payroll records in the control group. A second series of models compared treatment group II with the control group. Treatment Group II included

69,966 payroll records. The initial model in each series contained all observations from the control group and the appropriate treatment group. Additional models in each series considered subgroups of observations according to the fixed personal characteristics of the workers such as gender, ethnicity, and type of job (i.e., server, bartender, manager, etc.).

In the first series of models, the smoke-free law variable (Law  $T_1$ ) applied to those individuals in treatment group I (individuals who worked at a restaurant both before and after the smoke-free law). Law  $T_1$  was assigned the value of 0 for all individuals in the control group and the value of 1 for all individuals in treatment group I. Individuals in treatment group II were not included in this model.

In the second series of models, the smoke-free law variable (Law  $T_2$ ) applied to individuals in treatment group II. Law  $T_2$  was assigned the value of 0 for all individuals in the control group and the value of 1 for all individuals in treatment group II. Individuals in treatment group I was not included in the sample for this model.

$$(1) \text{ Sep} = f(\text{Age, Race, Gender, Ten, Law } T_1)$$

$$(2) \text{ Sep} = f(\text{Age, Race, Gender, Ten, Law } T_2)$$

Equations (1) and (2) were run using a panel logit model with fixed effects<sup>75</sup> with each employee-month serving as a single observation. STATA econometric software was used to estimate the models using the logistic command.<sup>76</sup> A series of dummy variable were included to control for the restaurant worked, and for the month in which the pay period took place. Such separate intercepts by restaurant and month reflected the impact that the characteristics of a particular restaurant had on separation rates, as well as the

business cycle conditions (based on month). Error terms were grouped for each individual in the sample.

The first model pooled observations from members of Treatment Group I, Treatment Group II, and the Control Group. This model examined the impact of a smoke-free law on the probability of separation for all workers, regardless of when the workers began working at the restaurants. A variable indicating whether each worker's place of work faced a smoke-free law was assigned a value of 1 for all pay periods in either Treatment Group I or II, and a value of 0 for pay periods in the Control Group. The probability of separation was modeled as a function of an employee's job tenure, job tenure squared, personal characteristics, and the presence of a smoke-free law. There also were dummy variables for each restaurant to control for idiosyncratic working conditions and for each month-year from April 1999 through April 2004 to control for season and business cycle. Some employees had two employment spells at a restaurant, and each spell was treated as separate members of the panel. A dummy variable was used to indicate the second employment spell. A dummy variable also was included to indicate that a worker was employed at a restaurant that opened smoke-free.

***Specific Aim #2. Examine the effect of implementation of smoke-free laws on restaurant training costs.*** The analysis to test Specific Aim #2 was at the restaurant level. The focus in this analysis was on whether restaurants operating in a community with a smoke-free law had different hiring and training costs than restaurants in communities without such a law. The decrease in the probability of separation measured in Specific Aim #1 due to the smoke-free law was multiplied by the hiring and training costs per worker to estimate the overall hiring or training cost effect for each restaurant.

## D. RESULTS

Coefficient estimates from the logistic regression are presented in Table 1, along with estimates on the marginal effect of each variable on the probability of separation. Coefficients for individual month and restaurant dummies are not reported for brevity but are available from the second author upon request. In all regressions, the probability of separation fell with job tenure. At mean values for tenure and tenure-squared, the marginal effect of additional days of tenure reduced the probability of separation. The probability of separation also was lower for workers in their second spell of employment at a restaurant, perhaps because these workers are more familiar with the requirements of the job.

The likelihood of separation was related to ethnicity. Relative to white workers, the probability of separation was lower for Hispanic workers but higher for African American and Native American workers. Sex was not related to the probability of separation but older workers were less likely to separate from the job.

### *Specific Aim #1*

Results for all workers in Table 1 are for the case where both Treatment Groups and the Control Group are pooled. The treatment group impacts in this case pertain to all workers at a restaurant facing a smoke-free law, regardless of whether they joined the restaurant before (Treatment Group I) or after (Treatment Group II) the smoke-free law went into effect. No statistically significant relationship was found between the presence of a smoke-free law and the probability of employee separation.



Results for existing workers are for the case where Treatment Group I and the Control Group were pooled. Treatment group impacts pertain to workers who were already employed at a restaurant when its community adopted a smoke-free law. The presence of a smoke-free law was not related to the likelihood of separation of existing workers.

Results for new workers are for the case when Treatment Group II and the Control Group were pooled. The presence of a smoke-free law also was not related to the probability of separation for these workers.

While Table 1 shows the relationship between a smoke-free law and the probability of separation for all types of workers, we examined whether the effect could differ by type of worker including floor workers (i.e., servers, bartenders, and hostesses), kitchen workers, managers, and all other occupations (i.e., caterers). In Table 2, we report the “marginal effect” of adopting a smoke-free law by occupation. A specific marginal effect is reported for those occupation groups where the law had a statistically significant impact on the probability of separation (i.e., the value of the coefficient on law variable was statistically different than zero). If there was no statistically significant impact on the probability of separation, then “no change” is reported in Table 2. The presence of a local smoke-free law reduced the probability of separation for floor workers but increased it for kitchen workers. The marginal effect for kitchen workers indicates that 1.4 out of 100 kitchen workers in any given 2-week period would quit if the community has a smoke-free law. On the other hand, findings revealed an opposite effect for 0.5 out of 100 floor workers.

***Specific Aim #2***

Table 3 summarizes the training costs for floor and kitchen workers based on the separation analyses. Thomas and King reported hiring and training costs of \$500 per floor worker and \$750 per kitchen worker. Given the marginal effects, and 26 pay periods per year, there would be 6.3 fewer separations for floor workers each year in a “typical” restaurant with 45 floor workers. However, there would be 5.3 more separations for kitchen workers (based on 15 kitchen workers in a “typical” restaurant). Since the hiring and training costs are 50% higher for kitchen workers, the estimated net effect is an approximate \$800 increase in annual training costs per restaurant. This estimated net effect is very low, given the exorbitant annual operating expenses per restaurant. This low estimated net effect on training costs is a natural outcome, given that our regression analysis indicated that the presence of a smoke-free law had no effect on the probability of separation across all worker occupations.

Table 1  
Factors Related to the Probability of Separation

Variables	Coefficients			Marginal Effects		
	All Workers	Existing Workers	New Workers	All Workers	Existing Workers	New Workers
Intercept	-2.089 *** -29.45	-2.059 *** -28.48	-2.087 *** -29.41			
Age	-0.0044 *** -3.94	-0.0048 *** 4.10	-0.0042 *** -3.78	-0.000160 ***	-0.00017 ***	-0.00015 ***
Gender (Male=1)	0.011 0.81	0.0076 0.53	0.012 0.381	0.00040	0.00027	0.00044
Tenure (Days)	-0.0022 *** -63.50	-0.0023 *** -61.87	-0.0023 *** -63.89	-0.000081 ***	-0.000082 ***	-0.000084 ***
Tenure Squared (1000 days-squared)	0.000438 *** 28.11	0.000442 *** 28.06	0.000443 *** 28.20	0.000016 ***	0.000016 ***	0.0000162 ***
African American	0.15 *** 5.24	0.15 *** 5.04	0.15 *** 5.29	0.0058 ***	0.0057 ***	0.0059 ***
Hispanic	-0.098 *** -3.79	-0.099 *** -3.36	-0.091 *** -3.51	-0.0034 ***	-0.0034 ***	-0.0032 ***
Asian	0.27 1.22	0.32 1.36	0.24 1.04	0.011	0.013	0.0097
Native American	0.20 *** 2.94	0.20 ** 2.68	0.21 *** 3.02	0.0079 ***	0.080 **	0.0083 ***
Race Not Specified	0.077 * 1.71	0.087 * 1.76	0.078 * 1.73	0.0029 *	0.0033 *	0.0030 *
Law in Effect	-0.024 -0.35	0.12 1.36	-0.047 -0.67	-0.00085	0.0044	-0.0017
Second Spell	-0.21 *** -9.10	-0.20 *** -8.28	-0.21 *** -9.14	-0.0070 ***	-0.0068 ***	-0.0071 ***
Opened Non-Smoking	-0.32 ** -2.53		-0.18 -1.64	-0.010 ***		-0.0060
N	589186	519220	574259			
Pseudo R-Square	0.0529	0.0554	0.0520			

\*\*\*=1% significance, \*\*=5% significance, \*=10% significance.

Table 2

## Effect of Ordinances on the Likelihood of Separation

Occupation	Statistical Outcome
All Workers	No Change
Floor Workers	-0.0054
Kitchen Workers	0.014
Managers	No Change
Other Occupations	No Change

Table 3

## Change in Annual Training Costs Per Location

Occupation	Statistical Outcome	# of Workers in Occupational Group in a "Typical" Restaurant	Pay Periods Per Year	Hiring/Training Cost per Worker	Total Annual Cost
Floor Workers	-0.0054	45	26	\$500	(\$3,150)
Kitchen Workers	0.014	15	26	\$750	<u>\$3,975</u>
					\$825

## **E. CONCLUSIONS**

The presence of a smoke-free law was not related to the overall probability that restaurant workers would separate from their job. This finding indicates that training costs associated with employee turnover would not rise with smoke-free laws. However, the probability of separation increased for kitchen workers but declined for floor workers. On net, the two effects were similar in magnitude, whether measured by the change in worker separations or the cost of training new workers at a typical restaurant. Thus, the findings for these specific occupations were consistent with the overall finding of no effect. This study benefited from access to the employment records of a national restaurant franchiser operating 75 establishments throughout the United States.

## **II. FUTURE RESEARCH**

This study was the first to examine the relationship between smoke-free laws and employee separation. Future research will examine other topics related to business costs and smoke free laws. In particular, future research will examine how smoke free laws impact business maintenance costs related to reduced need for maintenance in smoke-free facilities, or capital costs in terms of designing new restaurant structures, or modifying existing restaurants and bars (e.g., adding outdoor patios).

Future research on employee turnover and smoke-free laws is needed to examine other factors that influence bar and restaurant employee turnover including education level, tobacco use status, family structure, or major life changes such as graduation.

A related issue to turnover is to examine whether smoke-free laws influence worker wages. Members of the research team have begun a study on this topic, and a

poster presenting some preliminary study results is provided under the section on *Submitted Manuscripts and Conference Presentations*.

Another future focus for turnover research would be to consider the regional or geographic dimension of local smoke-free ordinances in more depth, and the related issue of the differential effect of public (mandatory local laws) versus private (voluntary policies by business owners) smoke-free restaurants. In particular, workers in communities with public (i.e., mandatory) smoke-free laws may have different labor market outcomes if there are alternative work environments which are readily available in nearby communities. Workers subject to private (i.e., voluntary) smoke-free policies at their workplace naturally have alternative work environments in close proximity to other businesses within the same community.

Economic theory suggests that local regulation of indoor smoking may reduce business profits and consumer and worker satisfaction by restricting choice. In this view, profits and worker and consumer satisfaction are better served if selected restaurants and bars voluntarily adopt smoke-free policies in order to attract customers and better organize the work environment.<sup>2</sup> However, economic theories regarding the spatial allocation of population and retail activity within metropolitan areas also suggest that communities (i.e., suburbs, urban neighborhoods) may compete for investment based on developing a set of urban amenities and costs such as taxes, zoning regulations, and other regulations.<sup>3</sup> In this view, by differentiating themselves, communities increase the choice of residents, workers, and businesses within an urban area by providing a differentiated mix of amenities and regulations. Each actor can “vote with their feet” to find the mix that appeals most to them.

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<sup>2</sup> W.J. Boynes and M.L. Marlow, “The Demand for Smoking Bans,” *Public Choice*, 88:1-2 (July 1996). 57-67.

J.M. Pogodzinski and J.R. Sass, “The Economic Theory of Zoning: A Critical Review,” *Land Economics*, 66:3 (August 1990): 294-314. and C. Tiebout, “A Pure Theory of Local Public Finance,” *Journal of Political Economy*, 64:5 (October 1956): 416-424.

Workers can use commuting to seek out their preferred mix of working conditions, including policies on workplace smoking. These two theories suggest that there may be a differential impact of voluntary versus mandatory policies, but also suggests that the impact of policies may differ based on the spatial location of alternative regulations within the economy.

Our database provider, Thomas and King, Inc., voluntarily made all of their restaurants smoke-free in May 2004, whether or not those restaurants were located in a community with a mandatory smoke-free law. After May 2004, we could utilize Thomas & King data in future research to examine the turnover and wage experience of workers in voluntarily smoke-free restaurants. From April 1999 to April 2004, we could use the data set from the current study to further analyze restaurants in communities with a public (mandatory) smoke-free policy. In particular, we could conduct a more detailed analysis on how the proximity to communities without a smoke-free ordinance impacts the effect of mandatory laws on turnover and worker wages.

### **III. POLICY IMPLICATIONS**

The findings of this study add to the body of literature showing no economic harm from smoke-free laws. As they educate policymakers and business owners, health advocates can use these scientific findings to provide evidence that smoke-free laws do not increase operating costs for restaurant owners. As the hospitality industry increasingly sees the value of smoke-free laws (see *Nation's Restaurant News*, July 24, 2006), the findings of our study will add to the growing acceptance of these laws within the business community. With fewer business owners opposing these laws, the likelihood that 100% smoke-free laws will be enacted and maintained may increase.

Our plan is to disseminate these findings far and wide in the advocacy community, the hospitality industry, and the general public after at least one paper is

published. We selected *Economic Letters* for the first paper since the turnaround time is relatively short (submitted April 2006; pending review). We plan also to submit a paper on training costs to a public health/tobacco control journal. Paul McIntyre with K.I.S.S. has been very helpful in agreeing to connect us with the National Restaurant Association, and we will submit an application to present at their May 2007 meeting. We also will submit a brief article to *Nation's Restaurant News* after the findings are published in a peer-reviewed journal. We will collaborate with Americans for Nonsmokers' Rights to disseminate the findings to advocates, policymakers, and the hospitality industry.

#### **IV. PROJECT ACCOMPLISHMENTS**

This research was the first known study to examine the relationship between local smoke-free laws and the costs of operating bars and restaurants. The study showed that one of the largest costs of operating these businesses – the hiring and training costs associated with turnover – are not affected by the presence of a smoke-free law. The project also presented a carefully balanced control and treatment group methodology that can be followed by other researchers who attempt to consider the impact of local smoke-free ordinances (or other local substance abuse policies) on the cost of doing business.

#### **V. SUBMITTED MANUSCRIPTS/CONFERENCE PRESENTATIONS**

**A.** Manuscript pending review in *Economics Letters* (reports findings for Arizona subsample only; see below)



## **Smoke-Free Laws and Employee Turnover**

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## **Smoke-Free Laws and Employee Turnover**

**Abstract** – This paper examines whether the presence of a local smoke-free law is related to the rate of employee turnover, an important operating cost for full-service restaurants. No relationship was found between the presence of a smoke-free law and the likelihood of employee separation.

**JEL Classification:** I18, J63

**Keywords:** smoking; regulation; employee turnover

## Introduction

While health and safety regulations are often set at the state and federal level, many local jurisdictions have the power to enact workplace regulations. In particular, there is a growing trend toward local regulation of workplace smoking. Today, nearly 500 local communities have enacted 100% comprehensive smoke-free laws. These regulations have the potential to influence the aggregate level of sales, worker behavior, and costs for businesses such as bars and restaurants that currently allow workplace smoking.

Health advocates support local smoking ordinances as a public health strategy to enhance workplace safety.<sup>4</sup> But, like all such safety regulations, including safety regulations at construction sites, mines or manufacturing plants, smoke-free laws have potential to introduce economic inefficiencies. Free from safety regulation, workers may choose to trade workplace safety for higher wages or other desirable features of a job. Minimum safety standards cause some workers to accept something less than what they would consider an optimal mix of safety, wages, and other employment features (Pakko, 2005). The introduction of a smoke-free law in a community may cause some workers to leave employment at community bars and restaurants.

While recent literature has examined the influence of smoke-free laws in terms of customer demand to patronize bars and restaurants (Pakko, 2005; Glantz and Smith, 1997; Hyland, Cummings, and Nauenberg, 1999), the purpose of this study is to examine how laws influence employee turnover, which is a key determinant of operating costs. We examine whether the likelihood of employee separation at a full-service restaurant

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<sup>4</sup> Bar and restaurant workers' exposure to secondhand tobacco smoke (SHS) is 1.5-4.4 times greater than that of individuals living with smokers (Siegel, 1993). Passive smoking causes coronary heart disease, lung cancer, and various respiratory ailments (California EPA, 2005; Law, 2003).

and bar is influenced by the introduction or presence of a local smoke-free law, after controlling for other factors that influence employee separation.

### **Factors Influencing Separation Rates**

The likelihood of a worker separating from their job falls with tenure as workers learn more about the rewards and conditions of a particular job, and employers learn more about the performance of workers (Bartel and Borjas, 1977; Viscusi, 1980). Personal characteristics such education, age, health, and sex further influence the likelihood of separation (Mincer and Jovanovic, 1981; Bartel and Borjas, 1977; Royalty, 1998). The introduction of a smoke-free law also could influence the “match” between a worker and their job, acting as a shock to the match that leads to an increase in separation rates for existing workers.

### **Methodology**

A panel data set with treatment and control groups was used for this study. A logistic regression of employee separation was estimated using data on employees of a franchiser of a national restaurant chain operating in the state of Arizona. The chain operated a full-service restaurant which served alcohol. The panel data set includes payroll records available for two-week pay periods for employees of 23 Arizona restaurants from April 1999 to April 2004 (see Table 1). Each two-week pay period for each employee served as a single observation. Of the 23 restaurants, 12 were smoke-free as of 2004 including three that opened smoke-free. Presence of a smoke-free ordinance was obtained from the Americans for Nonsmokers' Rights database ([www.no-smoke.org](http://www.no-smoke.org)) and confirmed with company management.

The Control Group consisted of restaurant payroll records during any period when a restaurant did not face a local smoking ban, either because the community where the restaurant was located never had a smoke-free law or because the ban was not yet in effect. There were 90,810 payroll records in the Control Group. Two treatment groups included restaurant payroll records during any period when a restaurant experienced a local smoke-free ordinance. Treatment Group I included 14,927 post-ban payroll records from employees who worked at a restaurant both before and after a community smoke-free law was implemented. For these workers, the introduction of a smoke-free law represented a potential “shock” to their work situation. Treatment Group II included 69,966 payroll records for employees who worked at a restaurant only after that a community smoke-free law was implemented.

Age, sex, ethnicity, job tenure, occupation, and separation date were obtained from company payroll records. Separation was assumed to occur at the date of each worker’s last entry in the payroll record. Of the approximately 9,300 workers in the payroll database, roughly one-third were still employed with the franchiser at the end of the data set.

The first model pooled observations from members of Treatment Group I, Treatment Group II, and the Control Group. This model examined the impact of a smoke-free law on the probability of separation for all workers, regardless of when the workers began working at the restaurants. A variable indicating whether each worker’s place of work faced a smoke-free law was assigned a value of 1 for all pay periods in either Treatment Group I or II, and a value of 0 for pay periods in the Control Group. The probability of separation was modeled as a function of an employee’s job tenure, job

tenure squared, personal characteristics, occupation, and the presence of a smoke-free law. There also were dummy variables for each restaurant to control for idiosyncratic working conditions and for each month-year from April 1999 through April 2004 to control for season and business cycle. Some employees had two employment spells at a restaurant, and each spell was treated as separate members of the panel. A dummy variable was used to indicate the second employment spell. A dummy variable also was included to indicate that a worker was employed at a restaurant that opened smoke-free.

The second model pooled Treatment Group I with the Control Group. The third model pooled Treatment Group II with the Control Group.

## Results

On average, 4.2% of workers separated from employment during a single two-week pay period (Table 2). The average tenure of workers was 539 days. Over half were female, while over 70% were White, roughly 20% Hispanic, and 3% African-American. The average age of workers was 26 years. More than half of the workers were employed as servers and about one-quarter as kitchen workers.

Coefficient estimates from a logistic regression are presented in Table 3, along with estimates on the marginal effect of each variable on the probability of separation. Coefficients for individual month and restaurant dummies are not reported for brevity but are available from the first author upon request. In all regressions, the probability of separation fell with job tenure. At mean values for tenure and tenure-squared, the marginal effect of additional days of tenure reduces the probability of separation. Further, re-estimates of the marginal effects at higher levels of tenure (such as tenure=2,000 days;

tenure-square=4,000,000 days) indicate that the marginal effect of additional days of tenure remain negative. The probability of separation also was lower for workers in their second spell of employment at a restaurant, perhaps because these workers are more familiar with the requirements of the job.

The likelihood of separation was related to ethnicity. Relative to white workers, the probability of separation was lower for Hispanic workers. Sex was not related to the probability of separation.

Results for all workers in Table 3 are for the case where both Treatment Groups and the Control Group are pooled. The treatment group impacts in this case pertain to all workers at a restaurant facing a smoke-free law, regardless of whether they joined the restaurant before (Treatment Group I) or after (Treatment Group II) the smoke-free law went into effect. No statistically significant relationship was found between the presence of a smoke-free law and the probability of employee separation.

Results for existing workers are for the case where Treatment Group I and the Control Group were pooled. Treatment group impacts pertain to workers who were already employed at a restaurant when its community adopted a smoke-free law. The presence of a smoke-free law was not related to the likelihood of separation of existing workers.

Results for new workers are for the case when Treatment Group II and the Control Group were pooled. The presence of a smoke-free law also was not related to the probability of separation for these workers.

Table 3 shows the average relationship between a smoke-free law and the probability of separation. Coefficient values for the dummy variable "Law In Effect"

reflect whether there was a constant, fixed relationship between the law and employee separation. While no fixed relationship was found in Table 3, it is possible that there is a varying relationship. We tested for this by running the all workers model from Table 3, but replacing the “Law In Effect” dummy variable with a set of 13 dummy variables indicating how much time that had passed since the law went into effect. For example, the first dummy indicated whether the smoke-free law was in effect for one quarter or less; the second dummy indicated whether the law was in effect from 4 to 6 months (i.e., the second quarter after the law went into effect). A final dummy variable indicated whether the law had been effect for more than three years.

Marginal effect estimates for the thirteen dummy variables are presented in Figure 1. The marginal effects were not jointly significant, and a statistically significant difference was only identified for two quarters (quarter 1 and quarter 6). There was no consistent relationship between smoke-free laws and employee turnover in the months and years following the adoption of a smoke-free law.

## **Discussion and Conclusion**

This study benefited from access to the employment records of a national franchiser operating 23 restaurants in the State of Arizona, a state where several communities have adopted smoke-free laws. Analysis indicates that the presence of a smoke-free law was not related to the probability that restaurant workers would separate from their job. This finding has implications for business owners confronted with regulations to prohibit smoking. While other business costs may rise with local smoke-



free ordinances, such as capital costs to build or expand outdoor seating,<sup>5</sup> the results of this research suggest that training costs associated with employee turnover would not rise.

This study was the first to examine the relationship between smoke-free laws and employee separation. Future research will examine how these laws impact other operating or capital costs for business. Future research on the turnover issue also may be able to access data on other factors that influence bar and restaurant employee turnover including education level, family structure, or major life changes such as graduation from school.

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<sup>5</sup> For example, 29 businesses in Lincoln, Nebraska obtained building permits to construct beer gardens or sidewalk cafes in the year after that city passed a law banning indoor smoking (*Lincoln Journal Star*, November 4, 2005). This was roughly an 80% increase over the 37 existing beer gardens or sidewalk cafes in the city.

Table 1			
Smoke-Free Restaurants			
Location	Opened	County	Community Went Smoke-Free
Restaurants in Communities With Smoke-Free Laws as of 2004			
Mesa, AZ (#1)	December 1992	Maricopa	July 1996
Mesa, AZ (#2)	November 1992	Maricopa	July 1996
Mesa, AZ (#3)	June 1993	Maricopa	July 1996
Mesa, AZ (#4)	November 1998	Maricopa	July 1996
Tempe (#1), AZ	June 1994	Maricopa	May 2000
Tempe (#2), AZ	April 1997	Maricopa	May 2000
Chandler, AZ	November 1997	Maricopa	October 2003
Gilbert, AZ	May 2002	Maricopa	May 2001
Tucson, AZ (#1)	September 1991	Pima	October 1999
Tucson, AZ (#2)	May 1994	Pima	October 1999
Tucson, AZ (#3)	March 1997	Pima	October 1999
Tucson, AZ (#4)	January 2000	Pima	October 1999
Restaurants in Communities Without Smoke-Free Laws as of 2004			
Phoenix, AZ (#1)	December 1992	Maricopa	No
Phoenix, AZ (#2)	May 1995	Maricopa	No
Phoenix, AZ (#3)	October 1995	Maricopa	No
Phoenix, AZ (#4)	June 2002	Maricopa	No
Peoria, AZ	September 1993	Maricopa	No
Scottsdale, AZ	December 1994	Maricopa	No
Prescott, AZ	February 1996	Yavapai	No
Glendale, AZ	August 1996	Maricopa	No
Goodyear, AZ	October 2000	Maricopa	No
Surprise, AZ	June 2001	Maricopa	No
Sierra Vista, AZ	September 2003	Cochise	No

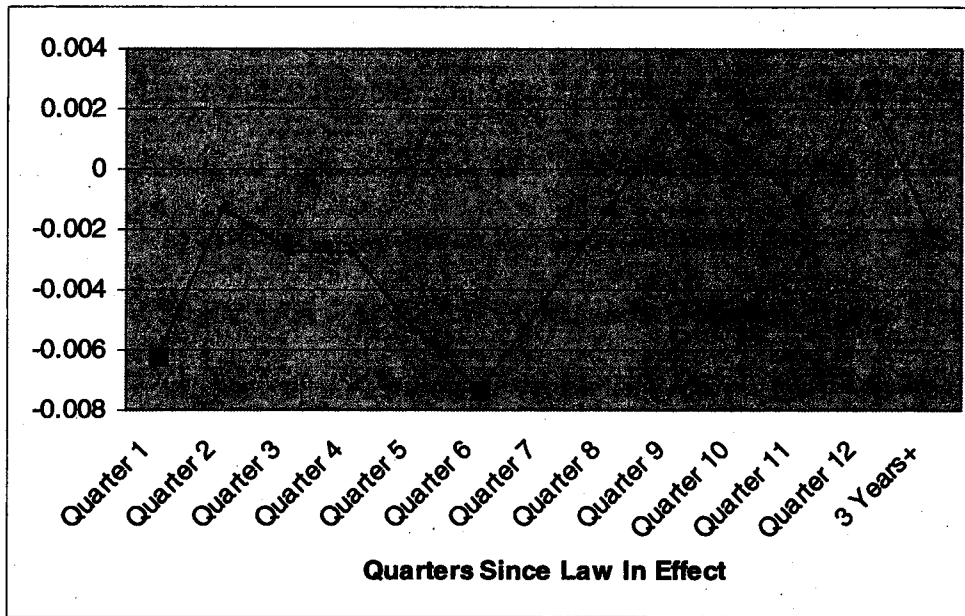
Table 2		
Summary Statistics		
Variable	Mean	Standard Deviation
<b>Probability of Separation and Tenure</b>		
Seperating During the Pay Period	4.2%	20.0%
Tenure	539 days	632 days
Tenure-Squared	685.343 days	1,603,303 days
<b>Personal Characteristics</b>		
Gender		
Male	47.8%	50.0%
Female	52.2%	50.0%
Age		
	26.1 years	7.0 years
Race		
White	71.4%	45.2%
Black	3.0%	17.1%
Hispanic	20.3%	40.2%
American Indian/Alaska Native	1.2%	11.0%
Asian/Pacific Islander	0.1%	2.9%
Not Specified	4.0%	19.5%
<b>Occupation</b>		
Server	54.8%	49.8%
Hostess	17.1%	37.6%
Bartender	2.0%	13.9%
Kitchen	24.3%	42.9%
All Other Occupations	1.8%	13.4%

Table 3  
Factors Related to the Probability of Separation

Variables	Coefficients			Marginal Effects		
	All Workers	Existing Workers	New Workers	All Workers	Existing Workers	New Workers
Intercept	-2.638 *** -17.45	-1.986 *** -4.95	-2.5 *** -17.26			
Age	0.004 * 1.74	0.0029 0.99	0.0048 ** 2.04	0.000131 * 0.000091	0.000091	0.000165 **
Gender (Male=1)	0.019 0.65	0.00956 0.25	0.0161 0.586	0.00061	0.000297	0.00055
Tenure (Days)	-0.0021 *** -25.90	-0.00207 *** -22.07	-0.0022 *** -22.77	-0.000068 ***	-0.0000645 ***	-0.000075 ***
Tenure Squared (1000 days-squared)	0.000491 *** 11.65	0.000468 *** 10.07	0.000517 *** 8.66	0.000016 ***	0.0000146 ***	0.0000178 ***
African American	0.088 1.14	0.0214 0.22	0.0931 1.20	0.00299	0.000067	0.00334
Hispanic	-0.172 *** -4.44	-0.161 *** -3.18	-0.172 *** -4.36	-0.00536 ***	-0.00483 ***	-0.0057 ***
Asian	0.350 0.76	0.570 1.05	0.250 0.49	0.0134	0.0233	0.00968
Native American	0.084 0.76	0.0313 0.21	0.0962 0.381	0.00283	0.000987	0.00346
Race Not Specified	0.042 0.60	0.0647 0.71	0.0404 0.57	0.0014	0.00207	0.00142
Law in Effect	-0.071 -0.98	-0.0419 -0.45	-0.0671 -0.87	-0.00230	-0.00129	-0.0023
Second Spell	-0.180 *** -3.82	-0.0919 -1.46	-0.183 *** -3.90	-0.00544 ***	-0.00275	-0.00589 ***
Opened Non-Smoking	0.133 0.88		0.00626 0.007	0.00453		0.000216
Server	0.013 0.31	0.0751 1.41	-0.0177 -0.42	0.000414	0.00234	-0.00061
Bartender	-0.341 *** -3.46	-0.171 -1.39	-0.373 *** -3.71	-0.00960 ***	-0.00495	-0.0110 ***
Hostess	0.063 1.23	0.116 * 1.73	0.040 0.77	0.00208	0.00376 *	0.0014
Other Occupations	-1.088 *** -8.97	-0.931 *** -6.65	-1.200 *** -9.13	-0.0231 ***	-0.0202 ***	-0.0259 ***
N	175703	105737	160799			
Pseudo R-Square	0.0441	0.0519	0.0413			

\*\*\*=1% significance, \*\*=5% significance, \*=10% significance.

**Figure 1**  
**Marginal Effect of the Presence of a Local Smoke-Free Law on**  
**the Probability of Separation**



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## B. Conference Presentations

Ogunro, Thompson, & Hahn. Smoke-free Laws and Wages of Restaurant Workers. Poster Presentation at the *World Conference on Tobacco OR Health*, Washington, DC, July, 2006.



**UK**  
UNIVERSITY OF KENTUCKY

### Smoke-free Laws and Wages of Restaurant Workers

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**PURPOSE**  
To examine the impact of 1996 smoke-free laws on the wages of restaurant workers

**BACKGROUND**

- Workers compensation modeled as competing wages and another associated with the job (i.e. working conditions)
- Smoking in restaurant represents a disamenity to restaurant workers for which they might require compensation
- If smoke-free environments are a valued good to workers, they might be willing to trade off lower wages for improved working conditions

**DATA ANALYSIS**

Control variables include:

- Age, age squared, tenure, tenure squared, gender, race, job type, and unemployment rate
- Month interactions, year dummies and dummies for restaurant chain
- Dummies for "nonsmoking" - interaction of chain with smoke-free law and the period after law enacted in these dummies

Variable	Mean	SD	Min	Max
Wage	8.50	1.50	6.00	12.00
Age	25.00	5.00	18.00	35.00
Tenure	1.00	1.00	0.00	5.00
Gender	0.50	0.50	0.00	1.00
Race	0.80	0.40	0.00	1.00
Job Type	0.30	0.45	0.00	1.00
Unemployment	0.05	0.02	0.00	0.10

**DISCUSSION**

- Smoke-free laws did not affect the wages of workers as a whole.
- There was no effect of smoke-free laws on the wages of bartenders, servers, or kitchen workers.
- In a given two-week period, bartenders working in smoke-free communities earned \$0.29 less than those in communities without smoke-free laws.
- A significant negative wage effect among bartenders is consistent with the idea that workers may value smoke free environments and may be willing to trade off higher wages for this amenity.

**FUNDING**

The Robert Wood Johnson Foundation Substance Abuse Policy Research Program, August 2004-July 2006 for the larger study.

Order # 372  
Client: Ellen Hahn CON-4  
Description: 3.5" x 6" Large Format Poster  
Due Date: July 7, 2006  
Artist: Matt Hazzard  
File Info: InDesign CS2  
Date: 7-3-06

PROOF 6

**TASC**

Teaching & Academic Support Center

Thompson, E., Hahn, EJ. Smoke-free laws and employee turnover. *North American Meetings of the Regional Science Association International*, Las Vegas, NV, November, 2005.

Hahn, EJ, Thompson, E, Rayens, MK, Blomquist, GC, Garen, JE, Mullineaux, DJ. Smoke-free laws and employee turnover. *National Conference on Tobacco or Health*, Chicago, IL, May, 2005.



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